

ABSTRACT

A method and apparatus for determining the position of a gamma ray interaction are disclosed. A medium that emits light in response to an interaction between a gamma ray and the medium is provided. A plurality of photodetectors is used to detect the light and determine a first three-dimensional position of the interaction. A field is produced in the medium that directs ionization electrons resulting from the interaction to a collector. A portion of a shutter system that corresponds to the interaction is opened. The shutter selectively blocks and permits the passage of the ionization electrons to the collector. A second three-dimensional position of the interaction is determined by localizing a two-dimensional position of the interaction in the collector and determining a third dimension based on a time of arrival of the ionization electrons relative to when the light is detected.